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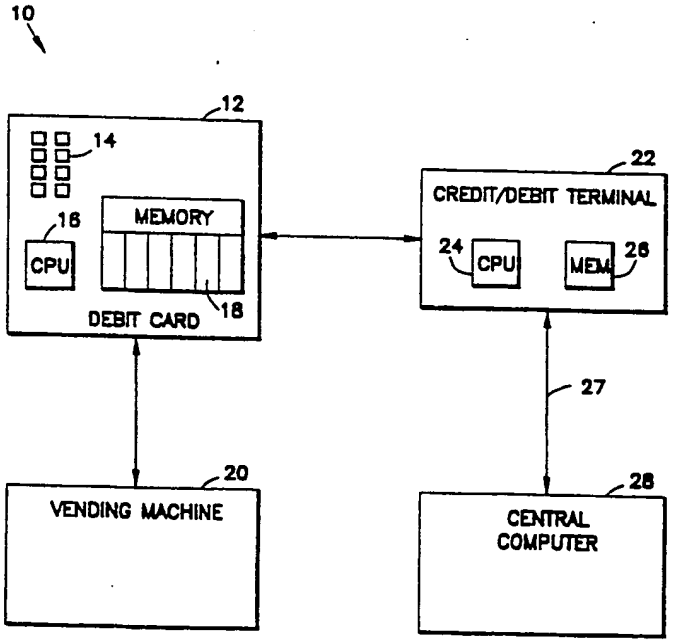
(54) Title: MICROCOMPUTER DEBIT CARD



(57) Abstract

A debit card (12), including a microcomputer (16). The microcomputer (16) is programmed such that a plurality of memory zones are available with differing levels of accessibility to each of the zones. Funds may be transferred from an external source into the zones, or funds may be transferred from zone to zone.

* See back of page

MICROCOMPUTER DEBIT CARD

Field of the Invention

The present invention relates to debit cards, and more particularly, to a debit card having a first protected account having restricted access and a second unprotected account having less restricted access.

Background of the Invention

The present invention relates to a debit card apparatus and the method for programming the same. More particularly, the present invention relates to a debit card apparatus and a method for programming the same to be used in applications where funds must be transferred routinely.

The debit cards are substantially flat, thin plastic articles, such as credit cards, bank cards, drivers licenses, membership cards, etc., currently in widespread use. Recently, manufacturers of these cards have provided such cards with their own integrated circuit or their own microcomputer. The debit cards may contain the same external qualities of the credit card, including the magnetic stripe, photo ID, printing, and embossing.

A debit card contains one or more integrated circuits (IC) chips. The chips provide microprocessing, memory, and an input/output capability. The memory in most types of debit cards has a nonvolatile property found in some of the best hand-held calculators. This nonvolatile memory remembers stored data without a constant power supply. The size of the memory in microcomputers continues to increase as technology evolves.

The combination of credit-card size, nonvolatile memory, and computer chip provides a unique set of features that open new doors for solving old problems. These new qualities are dependable security, reliable off-line data storage, and microcomputer power.

Uses for cards comprising microcomputers include

restricted access and a second account having less restricted access.

In one embodiment, access to the restricted account requires use of a personal identifier number (PIN) whereas access to the second account does not require use of a PIN.

In one embodiment, the second account is accessible by a vending machine having an appropriate access key or access code.

In one embodiment, the present invention relates to a debit card apparatus, including a microcomputer. Memory in the microcomputer is programmed to include a plurality of zones. A first zone has a more restricted access than a second zone. There is a funds transfer means for transferring a funds amount from an external source into an account field of at least one of the zones. The funds transfer means may also transfer a funds amount from an account field of one zone to the account field of another zone.

A particularly advantageous feature of the present invention is that use of the debit card enables rapid transaction and debiting of an account. More specifically, in the food service and vending industries, the present invention allows a user to quickly choose a menu item, have an account debited, and receive the card and the food item back.

The present invention provides a debit card with a first protected account in a first memory zone that is accessible only by a personal identification number and a second unprotected account in a second memory zone that is accessible without a personal identification number. There are other memory zones which are separate and distinct and may share access to either the first or second memory zone.

Other memory zones may be included in the microcomputer. A third zone may have the lowest access restrictions. A fourth zone may be merely a record zone

personal identification number. Also, vendors may offer bonuses and awards to the card holder based on the number of transactions or level of deposits. These bonuses are an added incentive for the customer to use the debit card.

These and various other advantages and features of novelty which characterize the invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. However, for better understanding of the invention, its advantages, and objects obtained by its use, reference should be made to the drawings which form a further part hereof and to the accompanying descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

Brief Description of the Drawings

In the drawings, in which like reference numerals and letters indicate corresponding parts throughout the several views;

Figure 1 is a schematic drawing of a debit card system of the present invention;

Figure 2 is a diagrammatic view of the memory zone of a debit card of the present invention;

Figure 3 is a diagrammatic view of the access keys to the memory zones of the present invention;

Figure 4 is a flow diagram of the debit card of the present invention being utilized in a transaction terminal; and

Figure 5 is a flow diagram of the debit card of the present invention being used in a vending machine.

Detailed Description of the Preferred Embodiment

Generally, a debit card will be issued by a vendor of a product or service to a user. The user will have certain information programmed into the debit card via a terminal. There will be, in the narrowest sense, two

embedded in the card 12. The integrated circuits include a central processor unit (CPU) 16, reusable nonvolatile memory 189, and an input/output capability. The size of the memory can vary with a range of 256 to 2000 being preferred. Of course as more memory is made available, additional applications and functions can be added to the debit card 12. The debit card 12 will preferably use a standard ISO format for its interface function with other intelligent sites. In addition to its integrated circuits, the debit card 12 may include external features typically present on credit cards, cash cards, identification cards, etc. These features might include a magnetic stripe having information magnetically stored thereon, a photo identifier, printed information, embossed information, etc. The debit card 12 shown is preferably pocket sized; e.g., roughly the size of a standard credit card. Its carrier material might be the same type of plastic card stock used for credit cards. While the embodiment of the debit card 12 shown does not include a display, keypad, and battery, other embodiments of the debit card 12 might include a display, keypad, and/or battery and still be in keeping with the principles of the present invention.

In the system shown, the debit card 12 is shown as being used with a vending machine 20 and a credit/debit terminal 22. Use of the debit card 12 with the vending machine 20 allows the user to purchase a menu selection from the vending machine 20. The credit/debit terminal 22 shown allows the user to transfer funds in and out of the debit card 12, as well as from memory zone to memory zone within the debit card 12. The credit/debit terminal shown has a CPU 24, associated memory 256 and interfaces with a remote central computer 28. The interconnection between the credit/debit terminal 22 might be accomplished by any number of ways; e.g., conventional telephone lines 27 as shown, dedicated lines, wireless transmission, etc. The central computer

level. For example, there may be only certain fields within a memory zone which are accessible to a user. Zones may be shared by applications, e.g., there may be subzones set up within a given memory zone with each subzone being assigned to a different vendor. It will be appreciated that the debit card may take on numerous variations in its design.

Diagrammatically illustrated in Figure 2 is a schematic flow diagram of schematic organization of an embodiment of microcomputer memory 30 of the present invention. There is a common data zone 32. There is a food service application protected memory zone 34. There is a vending application unprotected memory zone 36. There is a shared food service application protected memory zone 38. There is a shared vending application unprotected memory zone 46. There is an access application memory zone 42, and a transaction record zone 44. Funds may be transferred from the first protected account field of the food service application zone 34 to the second unprotected account field of the vending application zone 36. The transfers may flow in either direction between these two zones. The protected memory zone 34 requires some sort of user identification such as a personal identification number (PIN) to access the first protected account field of the protected memory zone 34. On the other hand, a general terminal which interfaces with a card may access second unprotected account field of the unprotected memory zone 36.

In the preferred embodiment, the debit card 12 will include a plurality of memory zones having different fields of information. The memory zones of one embodiment will now be discussed.

Zone 0

The common data zone 32 is one of many zones envisioned in the present invention. The purpose of the

field of the service application protected zone. Possible fields for this transfer include payroll deduction plans and cash/change machines, wherein cash or change may be inserted into a terminal and recorded thereafter in the protected account of the service application protected zone.

Fields may be set up which allow the user to borrow against the service application protected memory zone such that IOU's are recorded. There also may be a maximum amount specified for the unprotected account field.

A drop-dead data field may be implemented into the service application protected memory zone. The purpose of the drop-dead data field is to disable the card after a predetermined length of time. After a designated period of nonuse elapses, that amount of funds in the protected zone of the card becomes unavailable through the user of the card. This protects both the user and the issuer of the card. If the user were to lose the card and the period of time elapsed, the card would become useless to anyone attempting to use the debit card. Furthermore, this feature protects the issuer of the card from reimbursing a user who claimed the card was stolen, but later finds that the user uses the card after reimbursement from the issuer of the card. This feature allows the issuer of the card to wait until the period of nonuse occurs before reimbursing the user. After this period, the card becomes useless.

Other fields that might be included within the protected zone are maximum advances per month, month of last advance, month advance this month, amount in protected area, total amount of non-vending purchases, total number of non-vending purchases, and date of last vending purchase. All these values may be used to monitor the user's use of the debit card.

Promotional programs may be set up such that if the user frequents a specific terminal, transfers a certain

the debit card to be used in more than one set of terminals or applications. The original issuer of the debit card would provide a second party with a format code key which accesses the shared protected zone 38 and which in turn provides the access key to the protected memory zone. This would allow the second vendor of services or products to use a debit card in the same manner as the original issuer of the card, but may use it for entirely different services. Multiple applications could be used in each card. In addition to the preferred food service industry, other services, such as check cashing, health care, ticket purchasing, equipment checkout, and building access are among the few that could be implemented into the present invention. Additional shared protection application zones 46 might be present.

The original issuer of the card could, thus, license out the use of other shared protected application zones. This "licensing" would also minimize the number of cards that a user would have to carry.

Shared Vending Application Unprotected Zone

A fourth memory zone, the shared vending application unprotected zone 40, similar to the shared protected application zone, may be formatted for a different use. The issuer of the card provides a third vendor of services or products with a format key for accessing the shared unprotected zone which in turn provides access to the unprotected zone such that the funds in the unprotected account may be accessed for various applications. The third vendor may then provide an application, such as vending applications, such that the user may use the debit card in the third vendor's vending machines. The third party would have access to the amount in the unprotected zone, but would not have access to the amount in the protected zone. This would allow the original issuer of the card to license access

memory.

Figure 4 is a flow diagram describing the events occurring at a transaction terminal. A card user inserts a card in a transaction terminal. The card user must enter a personal identification number. The card user has a choice whether to transfer funds to the first protected account from an external source or transfer funds from the first protected account to the second unprotected account. If the user chooses to transfer funds from an external source, the external source must be designated. Possible external sources of funds may be cash, payroll deductions, bank savings, checking accounts, credit cards, etc. The amount to be transferred must be less than or equal to the amount available in the external source. If it satisfies this criteria, the transfer is made into the first protected account of the first protected zone and the balance is displayed. If there are insufficient funds, the transaction terminal will not allow the transfer and an alert signal will be displayed on the terminal.

If the funds are to be transferred from the first protected account to the unprotected account of the second zone, the amount to be transferred must be less than or equal to the amount available in the first zone. The amount is then transferred to the second zone. If the amount to be transferred is greater than the second zone's maximum limit, the transaction terminal will not allow the transfer to take place and the alert display will occur on the terminal. If the transaction does not exceed the maximum limit, funds will be transferred and remaining balances of the first and second zones will be displayed on the terminal. The user then exits the transaction terminal.

Figure 5 is a flow diagram describing the events occurring in a vending application. The user inserts a debit card into the vending machine and selects a menu selection. The vending machine accesses the unprotected

WHAT IS CLAIMED IS:

1. A method for making a debit card, including a microcomputer, the method comprising:

(a) programming the microcomputer to comprise a plurality of distinct memory zones, first account field of a first memory zone having more restricted access than a second account field of a second memory zone; and

(b) programming the microcomputer to transfer funds from an external source into at least one of the zones and to transfer funds form the first zone to the second zone.

2. A method in accordance with claim 1, including the steps of programming the microcomputer so that the account field of the first memory zone is accessible with a personal identification number.

3. A method in accordance with claim 1, further including the steps of programming the microcomputer to comprise a third memory zone having a less restrictive access than the second memory zone.

4. A method in accordance with claim 1, further including the steps of programming the microcomputer to comprise a plurality of separate and distinct memory subzones of the first memory zone.

5. A method in accordance with claim 1, further including the steps of programming the microcomputer to comprise a plurality of separate and distinct memory subzones of the second memory zone.

6. A method in accordance with claim 1, further including the steps of programming the microcomputer to comprise a fourth zone for the purpose of recording

13. A debit card in accordance with claim 9, wherein there is a plurality of separate and distinct unprotected second memory zones.

14. A debit card in accordance with claim 9, wherein there is a fourth memory zone recording data.

15. A debit card in accordance with claim 9, wherein the user may program an upper limit on funds available form the second account field.

16. A debit card in accordance with claim 9, wherein a time value may be programmed into the unprotected memory zone, such that after the time value has elapsed, remaining funds in the first account field become unaccessible through the use of the card.

17. A vending method comprising the steps of:

(a) inserting a debit card with a microcomputer memory into a vending machine, the debit card comprising:

(i) a plurality of distinct memory zones;

(ii) a first memory zone having an account field with more restrictive accessibility than an account field of a second memory zone;

(b) selecting an article to be vended;

(c) comparing the account field balance in the second memory zone of the debit card with the price of the article to be vended; and

(d) debiting the account field balance if the price of the article is less than the account field balance.

18. A debit card, comprising:

(a) a debit card having a microcomputer and memory comprising:

(i) a first account field located in

next usage, and if this elapsed time exceeds a predetermined amount, disabling any further transactions relative to the first account field.

26. A debit card in accordance with claim 18, including a key code look up table in memory identifying memory zones associated with a specific access code.

27. A debit card in accordance with claim 26, wherein selected memory zones will include an access field containing the access code of another memory zone.

28. A debit card in accordance with claim 18, wherein the debit card includes printed and embossed indicia thereon.

29. A debit card in accordance with claim 18, wherein the debit card includes a display.

30. A debit card in accordance with claim 18, wherein the debit card includes a magnetic stripe.

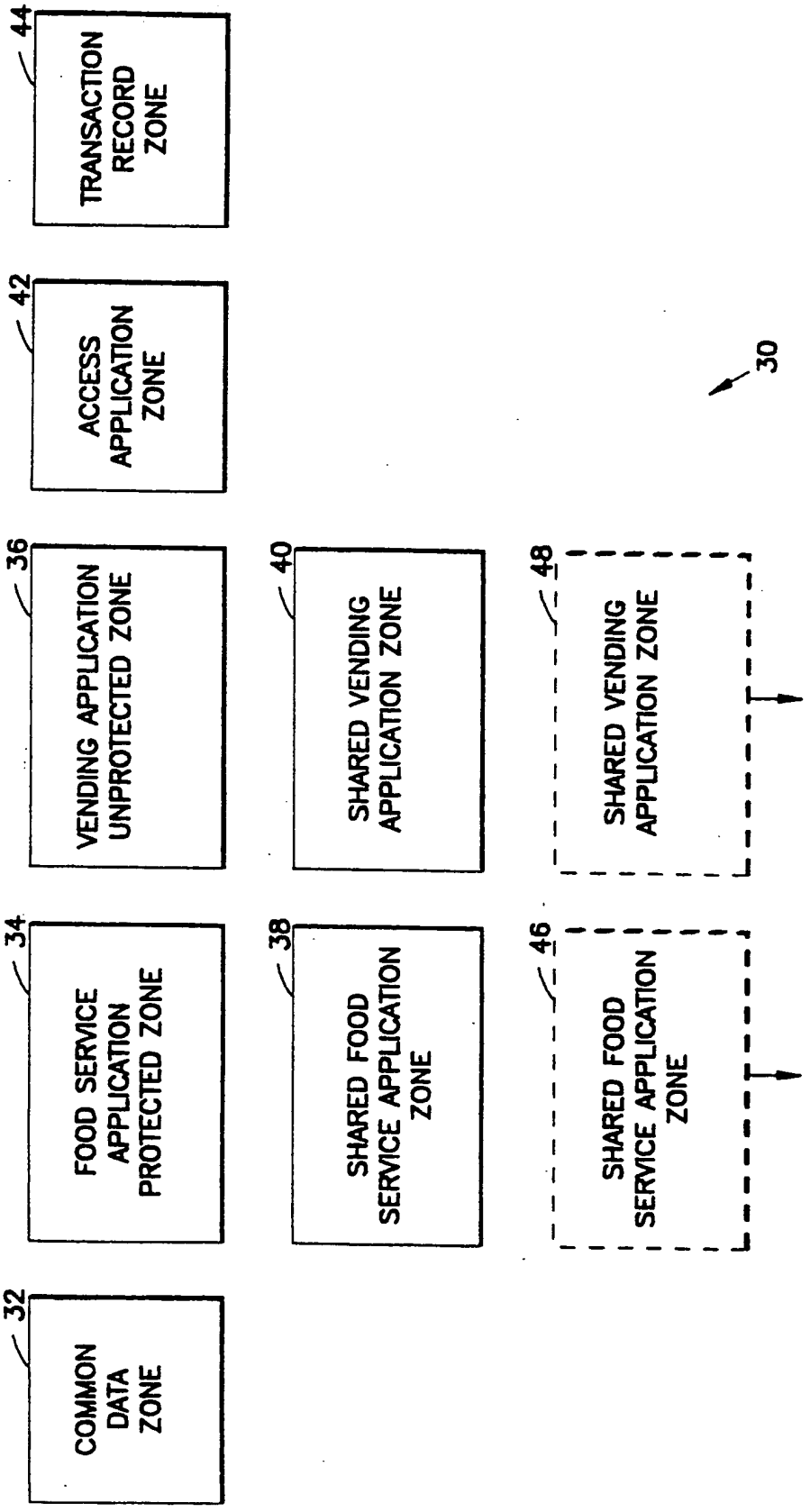


FIG. 2

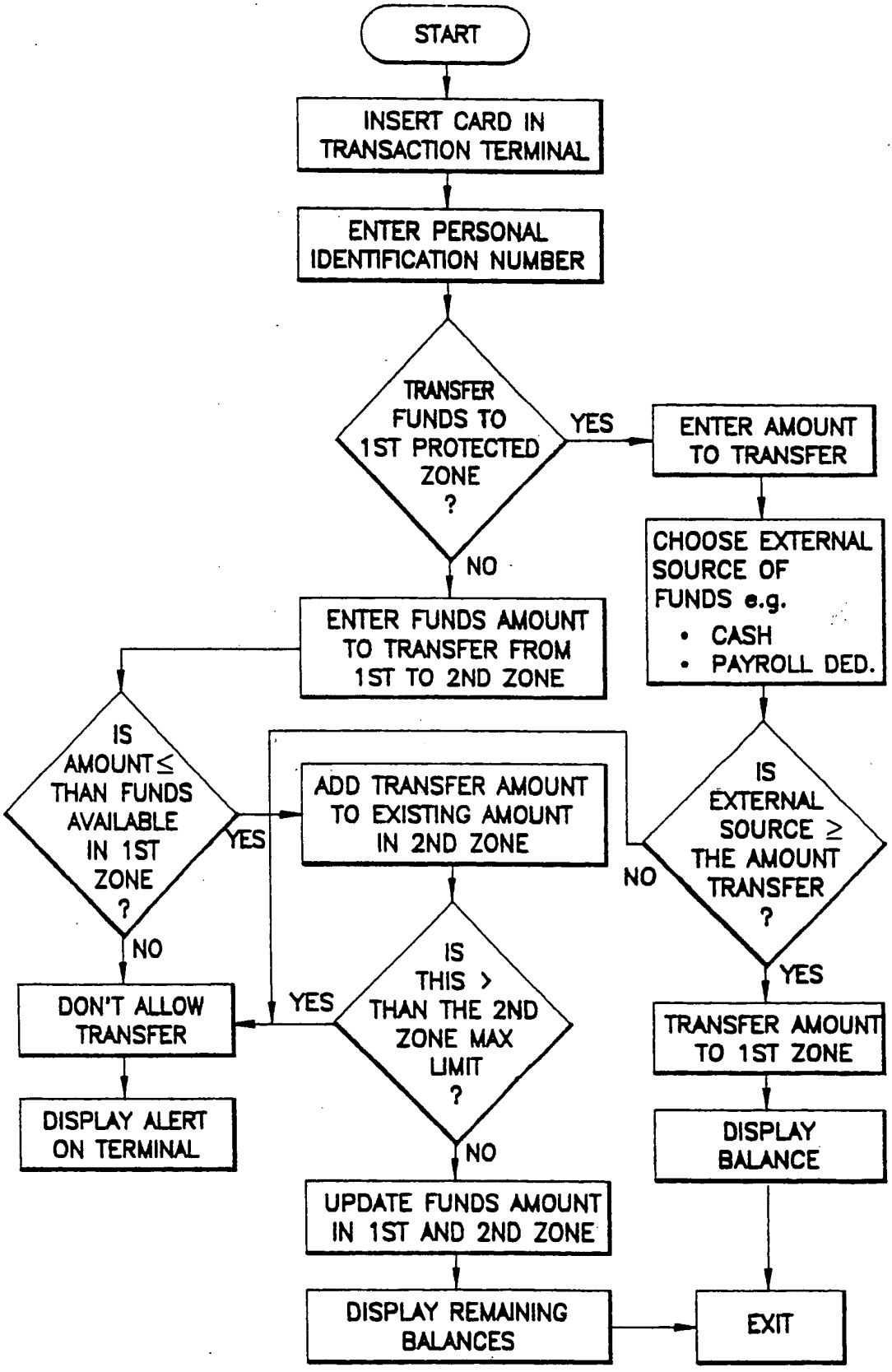


FIG. 4

SUBSTITUTE SHEET

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US90/02592

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC (5) : G06F 7/06, G06K 19/073

U.S. Cl : 235/380,381,487,492

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
U.S.	235/380,381,487,492

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
Y	US,A 4,367,402 (GIRAUD ET AL) 4 January 1983 See entire document.	1-30
Y	US,A 4,256,955 (GIRAUD ET AL) 17 March 1981 See entire document.	1-30
Y	US,A 4,211,919 (UGON) 08 July 1980 See entire document.	1-30
Y	US,A 4,204,113 (GIRAUD ET AL) 20 May 1980 See entire document.	1-30
Y,P	US,A 4,882,474 (ANDERL ET AL) 21 November 1989 See entire document.	1-30
Y	US,A 3,697,729 (EDWARDS ET AL) 10 October 1972 See entire document.	8,25

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search

18 July 1990

Date of Mailing of this International Search Report

15 AUG 1990

International Searching Authority

ISA/US

Signature of Authorized Officer

HAROLD PITTS

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